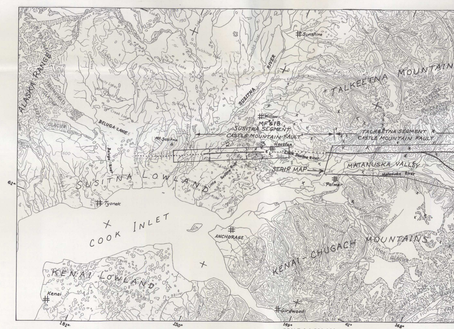
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF - 738
DETTERMAN - CASTLE MTN. FAULT, ALASKA

BASE FROM U.S. GEOLOGICAL SURVEY ANCHORAGE (D-8), 1950, (D-5), 1949, (C-4), (D-3), 1949, (C-6), 1951, (C-5), 1960, ALASKA



BASE FROM ARMY MAP SERVICE CORPS OF ENGINEERS, NPS-61956

FIG. 1. INDEX MAP SHOWING LOCATION OF CASTLE MTN. FAULT AND THIS MAP

EXPLANATORY NOTE

Geology and surface features along the Talkeetna segment of the Castle Mountain fault system, Alaska

One of a series of U.S. Geological Survey maps and reports that delineate and evaluate geologic hazards related to the earthquakes in Alaska, this strip map is designed to show the location and surface characteristics of the trace of the Castle Mountain and Caribou segments of the Castle Mountain fault system in the southern Talkeetna Mountains (Index map). In addition to fault traces, large individual landslides and areas of potential landslide are delineated. A companion strip map shows surface features of the Castle Mountain fault where it crosses part of the Susitna Lowland (Detterman and others, 1974). The character and location of these faults are critical to scientists and engineers who study faulting and earthquakes and will prove helpful to those concerned with earthquake hazards in the Matanuska Valley, which is becoming increasingly populated.

The heavy lines on the strip map denote the trace of faults as determined from both topographic features and bedrock displacements. No unequivocal evidence could be found to indicate displacement along the Talkeetna segment of the Castle Mountain fault system during the past several thousand years (late Holocene time), and there is no record of historic seismicity along it. However, the probable continuity between the active Susitna segment (Detterman and others, 1974) and the Talkeetna segment of the fault system strongly suggests that the Talkeetna segment may be potentially active.

GENERAL CHARACTERISTICS OF THE CASTLE MOUNTAIN FAULT SYSTEM

The Castle Mountain fault system, roughly 200 km long, is one of many large linear surface fault systems in Alaska (St. Amand, 1957; Jones, 1963; Grantz, 1966; Kirschner and Lyon, 1973). The Caribou and Castle Mountain segments extend from the Copper River basin westward to southwestward to Donne Creek near Castle Mountain, where they join. From there the fault system is a single break along the front of the Talkeetna Mountains and across at least part of the Susitna Lowland. Its western extent is not known. It may splay and die out in a series of horsts and grabens west of Mount Susitna, as suggested by Kirschner and Lyon (1973); the main fault could continue along strike an additional 250 km into the Lake Clark fault; or it could bend to merge with the Bruin Bay system of faults that extends southwestward for several hundred kilometers along the northwestern margin of the Cook Inlet basin. However, recent work suggests that neither the Bruin Bay nor the Lake Clark fault is active (Detterman and others, 1975; Plafker and others, 1975). Seismological studies planned under the Earthquake Hazards Project will help define the active segment(s) in the western part of the system. Until continuity between the Castle Mountain fault and other faults such as the Lake Clark and Bruin Bay faults can be positively demonstrated, we propose to restrict the name Castle Mountain fault system to the segments in the Susitna Lowland and Talkeetna Mountains.

The Castle Mountain fault system has been active for millions of years and is marked by net displacement of at least several kilometers. It is probable that the amount and sense of displacement across the fault varies along its extent and has changed with time during its long and complex history. Where the fault zone is exposed in the Susitna Lowland and Talkeetna Mountains, the fault is vertical or dips 80° or more northward. In late Tertiary (mainly post-Oligocene) time, the displacement has involved predominantly dip-slip reverse movement in which the north side is relatively uptrown (Detterman and others, 1974). Inferred vertical displacement ranges from a minimum of about 1.0 km in the vicinity of the Susitna Lowland (Kelly, 1963) to at least 3 km in the upper Matanuska Valley (Martin and Katz, 1912; Kelly, 1963; Grantz, 1966). Several kilometers to perhaps a few tens of kilometers of latest Cretaceous to Oligocene central strike-slip displacement is inferred by Grantz (1966) for the eastern end of the fault system in the Nelchina area from juxtaposition of lithologically dissimilar Cretaceous rocks together with the geometry and distribution of secondary faults and folds. On the basis of detailed geologic mapping in the Nelchina area, Grantz (1966 and 1966) concluded that there was at least some post-Oligocene lateral displacement on the Caribou fault and large late Cenozoic vertical movements along the Castle Mountain fault. He also showed that three fault-bounded blocks form structural high or "splay-wedge horsts" located at the convergence between the Castle Mountain and Caribou segments, at Sheep Mountain, and at the Bone Mountains.

Field investigations by the Alaskan Geologic Earthquake Hazards Project during 1974 suggest that the amount of uplift in the block between the Castle Mountain and Caribou segments increases westward that total horizontal slip on the fault in that area is in the order of 5 to 16 km right lateral. Central offset of 5 to 8 km along the Caribou segment is suggested by displaced allochemical of the Chickaloon River and Boulder Creek. If the similar successions of stratigraphic units on opposite sides of the Caribou fault were originally juxtaposed, there could have been an extreme maximum lateral offset of about 16 km, an unknown part probably produced by vertical movement across the fault.

LOCATION OF THE FAULT TRACE

The fault shown on the strip map was located by study of 1:20,000 and 1:40,000 scale aerial photographs and by traverses during June and July of 1973 and July of 1974 at most of the localities where the fault could be examined on the ground. The fault trace is probably located accurately to within 100 m in most places where shown by a solid line and to within 200 m where indicated by broken or dashed lines.

FIELD RECOGNITION OF FAULT TRACE

The traces of the Castle Mountain and Caribou faults are defined in the Talkeetna segment by juxtaposition of rock units that are grossly dissimilar in lithology, age, and structure. In a few deeply incised drainages and on steep-sided ridges, the fault zone consists of highly sheared and shattered rock as much as 30 m wide. The fault trace is commonly marked by subtle to prominent topographic features that reflect both the differences in bedrock geology across the fault and the presence of a zone of weakness along it (see generalized diagram of fault features).

The Talkeetna segment of the Castle Mountain fault system traverses the southern part of the Talkeetna Mountains in an area where local relief is approximately 1,200 m. For about 40 km between the Little Susitna River and Castle Mountain, a south-facing fault-line scarp defines the boundary between the Talkeetna Mountains on the north and the lower Matanuska Valley to the south. This prominent topographic break results from juxtaposition by faulting of resistant metamorphic rocks, granitic rocks of Tertiary and possibly Mesozoic age, and highly indurated clastic rocks of Paleocene age on the north against less resistant, predominantly clastic bedded rocks of Cretaceous and Paleocene age on the south.

Near Castle Mountain and eastward to Boulder Creek, the topographic expression of the fault is subdued. This results in part from the resistant lava flows within the Tertiary sequence south of the fault that hinder erosion of such prominent features as Castle Mountain and Puddingstone Hill, in part from partitioning of the fault displacement between the Castle Mountain segment and its major splay, the Caribou fault (Grantz, 1966).[1/] The wedge between the two

[1/] On the basis of alignment and relative amount of displacement, the Caribou fault is the main late Cenozoic segment of the Castle Mountain system east of the splay. The Castle Mountain strand east of the splay, however, is probably the older and more fundamental break of the two. We follow previous usage of the original mapping by Capps (1940) and terminology of Grantz (1966) in referring to the southern segment as the Castle Mountain fault in this area.

faults is composed of Cretaceous and Paleocene clastic rocks (intruded locally by small, mafic plutons) that are juxtaposed against Jurassic volcanic and sedimentary rocks on the north along the Caribou fault and against Tertiary clastic and mafic igneous rocks on the south along the Castle Mountain fault.

Between Boulder Creek and the east end of the map area, the wedge between the Castle Mountain and Caribou segments is mainly resistant Jurassic to Cretaceous volcanic and sedimentary rock that is intruded by numerous small Tertiary plutons of both mafic and felsic composition. These well-indurated rocks form a prominent south-facing fault-line scarp at Anthracite Ridge, where the older rocks are juxtaposed against poorly indurated Cretaceous and Tertiary clastic bedded sedimentary rock south of the Castle Mountain fault. North of the Caribou segment, where numerous resistant Tertiary lava flows cap the older volcanic and sedimentary rocks, the fault line is primarily a linear zone of weakness now occupied by upper Boulder and Chitna Creeks. In the Nelchina area, east of the fault segment shown on the strip map, both the Castle Mountain and Caribou Faults apparently die out into a complex system of splays (Grantz, 1966; Andreasson and others, 1964).

SEISMICITY

There is no compelling evidence to suggest that any part of the Castle Mountain fault system is seismically active. All seismic events since 1914 of magnitude 2.5 or greater in the vicinity of the Talkeetna segment of the fault system are listed in Table 1, the epicenters plotted on figure 2. The accuracy of location for these epicenters is estimated to be ±50 km prior to 1974 and ±10 km since that time, the precision of hypocenter (depth) determination probably ±10 to 20 km. By these data, there are no clearly near-surface earthquakes in the vicinity of the fault trace as would be expected if any of these events were associated with near-surface faulting. If the hypocentral depths are accurately determined, most, if not all, of the seismic events listed in Table 1 are related to processes in the lower part of the continental crust or beneath the continental crust, rather than to surface faults.

SPECIAL FEATURES ALONG THE TALKEETNA SEGMENT OF THE CASTLE MOUNTAIN FAULT SYSTEM

The most striking large-scale features along the segment of the Castle Mountain fault west of Castle Mountain and along the Caribou segment are the overall linearity, with an average N. 60° E. trend, and the predominant north-side-up geologic relations across the faults. On the basis of linearity, geologic relations, and displacement, the Caribou fault segment is now the direct continuation in the eastern part of the system and the eastward-trending segment of the Castle Mountain fault is a major splay of this system. The linear Talkeetna segment of the Castle Mountain-Caribou fault system has the same strike as the Susitna segment (Detterman and others, 1974) and is undoubtedly continuous with it in the subsurface. The Susitna segment is defined by a discontinuous scarp in Holocene deposits west of Houston (Index map), the Talkeetna segment by offset rock units and related topographic features extending eastward from Little Susitna gorge. A systematic search revealed no surface evidence of the fault in the intervening 30 km (shown on index map) covered by glacial deposits and alluvium of the Little Susitna River.

At Little Susitna gorge, the fault is represented by a well-exposed near-vertical shear zone 50 m wide across which overturned strata of the Arkose Ridge Formation on the north are juxtaposed against the presumably coeval Chickaloon Formation to the south. In this area, there is a probable fault within the Arkose Ridge Formation of the northern block that is subparallel to, and about 500 m north of, the Castle Mountain fault.

Between the Little Susitna River and Moose Creek, the fault traverses the lower slopes of Arkose Ridge in an area that has been overridden and strongly sculptured by Pleistocene glaciers that flowed westward along the Matanuska Valley. As a consequence, linear grooves and benches, some of which contain ponds, have been eroded along the shear zone of the Castle Mountain fault and the subparallel fault to the north. None of the glacial deposits appear to have been displaced by recent movement. Although some drainages are deflected where they cross the fault zone, there is no consistent direction or amount of deflection suggestive of holocene surface fault offsets.

From Moose Creek to Granite Creek, the fault zone is exposed in several streams that drain southward off Eska Mountain, marked locally by linear ridges, well-defined benches along the mountain front, and by prominent notches where it crosses gently sloping ridges. There is no indication of a fault scarp where the trace crosses glacial and alluvial deposits in the valleys of Moose Creek, or Granite Creek, or of systematic offsets in the numerous small creeks that cross the fault at nearly right angles.

From Granite Creek to Kings River, the Castle Mountain fault juxtaposes Paleocene Arkose Ridge Formation sedimentary rocks and Cretaceous or Tertiary intrusive rocks to the north against Cretaceous sedimentary rocks of the Matanuska Formation to the south. Bedding within the Matanuska Formation generally dips moderately to steeply south, near the fault, it becomes vertical. The Arkose Ridge Formation is variably deformed. The trace of the fault is marked by several conspicuous notches, linear ridges and gullies, benches, and deflected drainages. West of Sheep Valley the fault is a well-developed shear zone 30 m wide. Within, or near this zone, rocks are highly fractured, sheared, brecciated, and probably mylonitized locally. A prominent linear gully is developed along the fault trace west of the unnamed valley between Sheep Valley and Kings River. Here Cretaceous or Tertiary intrusive rocks form the bedrock to the north of the fault and large talus accumulations derived from steepened exposures in these rocks partially fill the deep gully along the fault trace. North of the Castle Mountain fault throughout most of this area, the trace of a northwest-trending subsidiary fault is marked by local shearing and fracturing and is topographically expressed by small notches and saddles.

Between Kings River and the Chickaloon River, the Castle Mountain fault is exposed prominently at its type locality in a saddle at the drainage divide between the two streams (see cross section A-A'), where it is a near-vertical shear zone 30 m wide. West of this saddle, the fault is locally marked by gentle notches in spurs on the north wall of a stream gully that trends generally parallel to the fault. East of the saddle, the Castle Mountain fault trace continues across Doone Creek and through a broad notch along the contact between the Cretaceous Matanuska Formation on the north and the Paleocene Chickaloon Formation to the south.

The Caribou fault connects with the Castle Mountain fault just east of the saddle north of Castle Mountain. It trends east-northeastward along the upper part of Doone Creek and near the base of a steep south-facing slope underlain by Jurassic bedded volcanic and sedimentary rocks cut by granitic intrusive rocks. In this segment there are large landslides along the fault trace; one is an active mass about 800 m wide that is characterized by closely spaced fresh fissures at the surface. These fissures characteristically trend roughly parallel to the slope and their uphill sides are relatively downthrown as much as 4 m. They appear to be formed by lateral deformation of the landslide mass. Just west of this landslide is a shear zone that lays about 150 m in a right-lateral sense immediately north of where it crosses the fault trace, apparently controlled by resistant volcanic strata within the Jurassic sequence rather than by active faulting. Neither the Castle Mountain nor the Caribou fault shows any topographic expression where the faults cross the glacial deposits and alluvium in the Chickaloon River valley. A dextral jog of about 2.7 km of the valley at this locality is believed to result mainly from control of the creek course by the weak fault shear zones, although some fault offset of the valley of Chickaloon Creek may have occurred.

The Castle Mountain fault trace east of the Chickaloon River is defined in part by the alignment of the gully formed by a small tributary of the Chickaloon River and by south-facing slope breaks or benches developed as a result of the lithologic contrast between the Cretaceous and Tertiary sequences juxtaposed along the fault. East east of Puddingstone Hill, an enormous multiple landslide has developed in Tertiary rocks south of the fault, its headwall along part of the fault trace. This slide is apparently an old feature that dammed up Boulder Creek. Infilling of a lake behind the landslide dam formed the broad Boulder Creek Flats. The toe of the slide is being cut away by Boulder Creek and its surface morphology suggests that it may still be active. Although the lake fill beneath Boulder Creek Flats is most probably of Pleistocene age, there is no apparent surface expression of the Castle Mountain fault where it is projected through the flats. The valley of Boulder Creek shows dextral offset of between 1 and 2 km where crossed by the fault; the exact amount is obscured by the broad lake fill in the valley.

East of Boulder Creek, the trace of the Castle Mountain fault segment is well defined by a series of linear gullies, saddles, notches, and by stream canyons aligned along the north side of Anthracite Ridge. The fault trace is further defined by contrasting lithologic sequences juxtaposed across the fault: north of the fault, resistant bedded Jurassic volcanic and sedimentary rocks intruded by several felsic Tertiary plutons; south of the fault, bedded Cretaceous and Tertiary clastic sedimentary rocks. Several large multiple landslides have developed in the sedimentary rocks south of the fault along Anthracite Ridge. At least two of these slides are still active; the largest involves an area of almost 13 sq km. Hicks Creek is offset about 300 m in a dextral sense at the fault crossing. To the east, the fault passes through a broad saddle in the ridge between Hicks Creek and Fossils Creek. In the valley of Fossils Creek and the valley of Dan Creek (at the eastern edge of the strip map), the trace is covered by glacial and lakebed deposits. The glacial deposits are slightly more than 8,000 years old (Williams and Ferrians, 1961). There is no conclusive evidence of movement since this glaciation except for a south-facing scarp of uncertain origin just south of a small pond near the head of Fossils Creek.

The Caribou fault trace in the area between the Chickaloon River and the Boulder Creek drainage is well defined by a series of benches, saddles, and notches on ridges, by stream canyons aligned along it, and, at one locality, by possible ponding of alluvium behind the fault scarp. In this area, lithologic contrasts across the fault readily account for the observed topographic features.

The Caribou fault segment enters the Boulder Creek flats at the point where the creek makes a sharp turn to the northeast, then follows the fault zone for about 7 km. There is an apparent dextral offset of the Boulder Creek valley by this amount, probably produced largely, or entirely, by control of the stream course by the shear zone and lithologic contrast across it rather than fault displacement. Steep-faceted ridges border both sides of the stream valley in this area. The alluvium in the Boulder Creek has not been offset by the fault. However, late Wisconsin glacial deposits in two north-trending tributary valleys apparently have been offset several meters by a subparallel fault about 300 m south of the projected trace of the Caribou fault. As this is in an area of steep terrain, part or all of the apparent offset may be due to gravity sliding.

East of Boulder Creek, the fault trace follows a series of linear gullies, notches, benches, and saddles before entering Chitna Creek. The lower part of Chitna Creek parallels the fault trace. The fault splays near Caribou Creek as mapped by Grantz (1960, 1965). A sequence of clastic sedimentary rocks of the Matanuska and Chickaloon Formation north of Chitna Creek is lithologically and structurally similar to the sequence exposed south of the fault just west of Boulder Creek. If these sequences were originally juxtaposed, there could be a maximum of 12 km of post-Paleocene dextral offset for this portion of the fault. However, there are no offset contacts or other piercing points in these sequences that provide unequivocal evidence of the amount of displacement in this area.

Several subparallel subsidiary faults cut the wedge between the Castle Mountain and Caribou segments between Boulder Creek and Hicks Creek, trending about N. 65° E. The faults cut Jurassic to Lower Cretaceous rocks south of the Castle Mountain segment. Field investigation of these faults was limited to areas where they join the Castle Mountain and Caribou segments. Their traces between these faults as taken from aerial photographs are well marked by numerous prominent surface features such as notches, benches, saddles, linear gullies, and scarps. In all cases, the north side is relatively uptrown, but the geology of the juxtaposed rock units is unknown.

In summary, the Talkeetna segment of the Castle Mountain fault system shown on the strip map is clearly defined for most of its extent by contrasts in lithology, shear zones in bedrock, and topographic features, including deflected drainage, linear canyons, benches, notches, saddles, and landslides. Nowhere in the area shown on the strip map, however, is there definitive evidence that the mapped faults have been active in Holocene time. In particular, there are no scarps, fissures, or other surface features developed where the fault trace projects through alluviated areas or areas covered by glacial deposits that would suggest fault displacement. Most stream that cross the fault trace at nearly right angles are undeflected. Those that are deflected could be controlled by zones of weakness along the faults, as they do not show systematic offsets that might be suggestive of holocene lateral movement. However, late Wisconsin glacial moraine appears to have been broken along subsidiary faults strands at three localities within the wedge between the Castle Mountain and Caribou segments east of Boulder Creek. This suggests movement at these localities within the past 12,000 to 15,000 years, but it is not known whether the breaks are produced by faulting or gravity slides localized along the faults. Planned field investigations of these breaks may resolve this question.

LANDSLIDE HAZARDS

Earthquake-triggered landslides are potentially the greatest seismic hazard in the area of this strip map. The mapped landslides are divided into general age categories in an attempt to ascertain a pattern that might suggest a particular area, rock unit, or topographic feature as suspect for future slides. A total of 153 landslides were mapped; they range from multiple slides covering about 12 to 13 sq km to slides of about 0 hectares (20 acres), the minimum size that can be shown at the scale of the map. There are hundreds of landslides too small to be shown that are not included.

Landslides are present in all stratigraphic units, including the surficial deposits. The evidence clearly shows that the largest slides and greatest numbers are in areas underlain by sedimentary rocks of Cretaceous and Tertiary age, and that the size and abundance is greatest in the eastern part of the area, particularly in the vicinity of Hicks Creek. The potential for destructive landslides is considered up to high in that area.

A combination of several geologic factors accounts for the abundance of landslides in the area of the map. Matanuska Valley and most of the tributary valleys were deeply eroded by Pleistocene glaciers that left valley walls greatly oversteepened, and many of these oversteepened walls are underlain by Cretaceous and Tertiary sedimentary rocks that contain numerous incompetent shale units along which sliding may occur. These rocks are highly fractured and sheared, particularly near the fault zones. Considering all of these geologic factors, we have indicated areas that we believe to have landslide potential. Some of the sites have a history of multiple landslides and will probably continue to be active in the future. Many of the sites are already incised parts of the Matanuska River and other principal rivers in the area where a major landslide could cause serious impairment of drainages with the possibility of lake formation, such as that formed by a slide in Boulder Creek, and a potential for downstream flooding in the event of rapid release of the impounded waters. Elsewhere landslides could cause serious disruption of traffic on the Glenn Highway.

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Determines that magnetic and gravity data indicated movement along Castle Mountain fault system is dissipated in the Copper River basin by a series of northwest-striking branch faults.

Barnes, F. F., 1962, Geologic map of the lower Matanuska Valley, Alaska: U.S. Geol. Survey Misc. Geol. Inv. Map I-359, scale 1:63,360.
Refined Martin and Katz' mapping of the Castle Mountain fault along Talkeetna Mountain front from Castle Mountain westward as part of coal investigations in the lower Matanuska Valley.

Barnes, F. F., and Payne, T. G., 1956, The Wishbone Hill district, Matanuska coal field, Alaska: U.S. Geol. Survey Bull. 1056, 85 p.
Applied name Castle Mountain fault to the fault mapped by Martin and Katz (1912) along south side of Talkeetna Mountains. Suggests vertical displacement of the order of 4,000 feet on fault north of Wishbone Hill and describes a crush zone of agglomerated rocks along fault zone.

Capps, S. R., 1940, Geology of the Alaska Railroad region: U.S. Geol. Survey Bull. 907, 201 p.
Extended mapping of the Castle Mountain fault by Martin and Katz from Castle Mountain eastward to Anthracite Ridge.

Detterman, R. L., Hudson, Travis, and Hoare, J. M., 1975, Bruin Bay fault inactive during the Holocene, in Yount, M. E., ed., U.S. Geological Survey Alaska Program, 1975: U.S. Geol. Survey Circ. 722, p. 45.

Detterman, R. L., Plafker, George, Hudson, Travis, Tysdal, R. G., and Pavoni, Nazario, 1974, Surface geology and Holocene breaks along the Susitna segment of the Castle Mountain fault, Alaska: U.S. Geol. Survey MF Map 618, 1 sheet.
Detailed strip map with data indicating 3.6 m vertical, and possibly 7.3 m horizontal displacement between 225 and 1000 years ago.

Grantz, Arthur, 1960, Geologic map and cross sections of the Anchorage (D-2) quadrangle and northwestern part of Anchorage (D-3) quadrangle, Alaska: U.S. Geol. Survey MQ Map I-342.
Names and determines the movement along the Caribou segment as the active part of Castle Mountain fault system east of the area of this strip map.

1965, Geologic map and cross sections of the Nelchina area, south-central Alaska: U.S. Geol. Survey open-file report, 4 sheets, scale 1:63,360.
First map and description of the combined Castle Mountain and Caribou faults. Shows that faults die out in a series of splays with associated splay-wedge horsts west of the western edge of Copper River basin.

1966, Strike-slip faults in Alaska: U.S. Geol. Survey open-file report, Sept. 2, 1966, 82 p.
Summarizes data on major strike-slip faults in Alaska and presents a geologic map and structure sections covering the eastern end of the Castle Mountain fault and its splay fault, the Caribou fault, in this report. Concludes that post-Oligocene displacements in the Nelchina area were vertical but that early Tertiary movements involved a large component of dextral slip.

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Jones, D. L., 1963, Upper Cretaceous (Campanian and Maestrichtian) ammonites from southern Alaska: U.S. Geol. Survey Prof. Paper 432, 53 p.
In this publication Grantz first applied the name Castle Mountain fault to the fault system.

Kelly, T. E., 1963, Geology and hydrocarbons in Cook Inlet basin, Alaska: Am. Assoc. Petroleum Geologists Mem. 2, p. 278-296.
Briefly describes Castle Mountain fault trace in Susitna Lowland as interpreted mainly from airphotos and subsurface data. Gives net displacement of 1,500-2,000 feet in the lowland based on seismic reflectrin work.

Kirschner, C. E., and Lyon, C. A., 1973, Stratigraphic and tectonic development of the Cook Inlet petroleum province: Am. Assoc. Petroleum Geologists Mem. 19, p. 396-407.
Suggests large late Cenozoic dextral strike-slip displacement of Castle Mountain fault in Susitna Lowland on basis of offset stream drainages and the best axial traces of some subsurface folds. Believes that the dextral component of movement is dissipated in several splays to the western Susitna Lowland in a manner analogous to that proposed by Grantz (1966, 1966) for the eastern end of the fault.

Martin, G. C., and Katz, F. J., 1912, Geology and coal fields of the lower Matanuska valley, Alaska: U.S. Geol. Survey Bull. 500, 90 p.
Mapped and described the Castle Mountain fault as a "...great fault or zone of faulting,..." along the south front of the Talkeetna Mountains from Castle Mountain westward. The fault was recognized to be a north-dipping reverse fault with large north-side-up vertical displacement.

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Sharp, R. V., 1974, Map showing recently active breaks along the San Andreas fault zone between San Bernardino area and Borrego Valley, California: U.S. Geol. Survey Misc. Geol. Inv. Map I-875, 3 sheets.

St. Amand, Pierre, 1957, Geological and geophysical synthesis of the tectonics of portions of British Columbia, the Yukon Territory, and Alaska: Geol. Soc. America Bull., v. 68, p. 1343-1370.
Inferred continuity between a major fault through Lake Clark and the Castle Mountain fault along the Talkeetna Mountains front.

Williams, J. R., and Ferrians, O. J., Jr., 1961, Late Wisconsin and Recent (Holocene) history of the Matanuska Glacier, Alaska: Arctic, Jour. Arctic Inst. North America, v. 14, no. 2, p. 83-90.
Determined that the Late Wisconsin advance (9,000 ± 300 B.P.) was only 8 km from present terminus, the Holocene advance 1.6 km beyond present terminus.

List of all seismic events of magnitude 2.5 or greater for month half of Anchorage quadrangle (1:250,000). Data source NOAA, 1934 to July 1974, and U.S. Geological Survey, Alaskan Network, July 1973 to October 1974.
U indicates data not computed

Date	Lat N	Long W	Magnitude	Depth km	Date	Lat N	Long W	Magnitude	Depth km
36 08 02	61.50	147.50	6.0	U	72 02 28	61.64	147.59	3.1	19
63 11 24	61.80	149.50	4.3	36	72 03 12	61.56	147.74	U	44
64 02 02	61.60	149.70	3.8	33	72 06 20	61.99	148.12	U	44
64 03 30	61.60	150.00	4.3	40	72 06 12	61.93	148.67	3.6	46
64 03 30	61.50	147.90	4.4	25	72 12 21	61.59	149.06	3.0	32
64 04 03	61.80	147.60	4.0	40	73 06 16	61.71	148.05	3.0	30
64 04 20	61.50	147.30	4.5	40	73 07 05	61.81	149.69	2.6	31
64 04 21	61.60	147.40	4.0	40	73 07 24	61.51	147.21	2.9	29
64 06 26	61.70	146.30	4.3	33	73 07 30	61.42	149.75	2.8	34
64 09 23	61.60	150.00	4.1	33	73 08 04	61.74	149.65	2.5	33
65 05 01	61.70	146.90	4.3	33	73 09 02	61.77	148.56	2.9	35
65 03 01	61.70	147.70	4.0	43	73 09 18	61.56	148.86	2.5	36
65 07 20	62.00	147.00	4.0	33	73 11 11	61.88	147.50	3.1	31
65 08 06	61.90	148.00	3.9	33	73 11 23	61.64	149.93	2.7	39
65 09 07	61.70	147.50	3.7	33	73 12 04	61.94	148.89	3.0	19
66 08 30	61.50	147.50	4.5	33	73 12 06	61.54	149.85	2.8	42
67 06 03	61.67	148.55	3.8	32	73 12 10	61.64	149.93	3.0	37
67 11 08	61.50	150.00	3.9	30	73 12 11	61.60	147.50	2.9	21
68 04 06	61.70	150.00	U	29	73 12 17	61.72	147.28	3.2	32
68 04 08	61.50	147.40	4.0	48	73 12 30	61.76	149.08	2.5	37
68 05 08	61.89	146.60	U	5	73 12 31	61.81	150.00	3.1	41
68 10 13	61.89	148.39	U	6	74 01 16	61.87	148.89	3.6	41
68 11 23	61.83	149.71	U	23	74 01 19	61.62	149.92	3.0	32
68 12 07	61.85	149.49	U	33	74 01 24	61.52	147.65	4.9	29
68 12 02	61.77	149.12	U	33	74 01 24	61.50	147.65	5.2	46
68 12 21	61.76	149.78	U	40	74 01 24	61.53	147.67	2.6	26
68 02 02	61.92	147.50	U	32	74 01 24	61.51	147.67	3.1	27
68 03 12	61.83	149.06	U	11	74 01 24	61.50	147.66	2.6	27
68 03 23	61.91	147.67	U	26	74 01 24	61.51	147.65	2.5	29
68 03 25	61.85	149.23	U	33	74 01 24	61.51	147.63	3.0	39
68 04 03	61.78	149.06	U	30	74 01 24	61.52	147.65	3.7	31
68 04 14	61.78	149.86	U	20	74 01 24	61.50	147.63	3.4	31
69 04 19	61.89	149.71	U	33	74 01 24	61.53	147.66	3.0	28
69 04 22	61.90	149.23	U	5	74 01 25	61.51	147.63	3.3	33
69 05 15	61.85	146.55	U	26	74 01 25	61.51	147.66	2.5	27
69 05 31	61.82	147.42	U	26	74 01 28	61.50	147.65	3.8	31
69 06 10	61.65	149.42	U	33	74 01 28	61.51	147.63	3.4	31
69 07 12	61.60	149.43	U	27	74 01 30	61.50	147.67	2.7	30
69 08 11	61.67	147.31	U	33	74 02 01	61.50	146.58	6.0	43
69 09 03	61.68	149.93	U	29	74 02 02	61.50	147.62	4.1	33
69 09 12	61.78	149.11	U	33	74 02 02	61.50	147.63	3.0	31
69 11 01	61.90	147.63	U	45	74 02 02	61.50	147.62	4.1	31
69 11 07	61.74	149.71	U	43	74 02 02	61.50	147.61	3.1	31
70 07 04	61.54	149.43	3.8	40	74 02 02	61.50	147.61	3.2	31
70 09 06	61.65	147.48	3.0	30	74 02 09	61.80	146.50	2.8	36
71 05 18	61.71	149.56	2.9	9	74 02 24	61.58	147.56	2.8	26
71 09 09	61.62	149.96	U	40	74 02 20	61.51	147.65	2.6	29
71 10 25	61.63	149.91	3.0	43	74 03 23	61.79	149.67	3.5	35
71 11 03	61.50	147.65	3.6	23	74 03 29	61.90	147.39	3.4	37
71 11 25	61.71	149.99	2.7	45	74 03 30	61.74	149.80	2.7	27
71 12 01	61.65	149.28	3.7	24	74 06 28	61.67	150.00	2.6	32
					74 06 18	61.66	149.92	2.6	13
					74 07 03	61.67	149.91	2.6	40
					74 07 07	61.97	148.89	3.5	23

GEOLOGY AND SURFACE FEATURES ALONG PART OF THE TALKEETNA SEGMENT OF THE CASTLE MOUNTAIN - CARIBOU FAULT SYSTEM, ALASKA

BY
ROBERT L. DETTERMAN, GEORGE PLAFKER, RUSSELL G. TYSDAL AND TRAVIS HUDSON

1976

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